(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 609 350 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.10.2017 Bulletin 2017/40

(21) Application number: **11767774.0**

(22) Date of filing: **25.08.2011**

(51) Int Cl.:
F16K 5/10 *(2006.01)* ***F16K 5/06*** *(2006.01)*

(86) International application number:
PCT/IL2011/000688

(87) International publication number:
WO 2012/025929 (01.03.2012 Gazette 2012/09)

(54) A METERING BALL VALVE

MESSKUGELVENTIL

ROBINET DOSEUR À TOURNANT SPHÉRIQUE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **25.08.2010 US 376682 P**

(43) Date of publication of application:
03.07.2013 Bulletin 2013/27

(73) Proprietor: **Ham-Let (Israel-Canada) Ltd.**
17105 Nazareth Illit (IL)

(72) Inventors:
- **SHESTATSKI, Felix**
  20100 Karmiel (IL)
- **SLOBITKER, Leon**
  21926 Karmiel (IL)
- **MARGOL, Boris**
  22407 Nahariya (IL)
- **BRAVERMAN, Isak**
  23042 Migdal Ha-Emeq (IL)

(74) Representative: **Lecomte & Partners**
P.O. Box 1623
1016 Luxembourg (LU)

(56) References cited:
DE-C- 103 809
GB-A- 508 337
GB-A- 2 238 094
US-A- 1 921 779
US-A- 1 973 418
US-A- 2 257 880

EP 2 609 350 B1

Description

FIELD OF THE INVENTION

[0001] The present invention generally relates to valves, and more specifically, to a combination of a ball valve with a needle and/or metering valve.

BACKGROUND OF THE INVENTION

[0002] Valves suitable for use in instruments and instrumentation systems are well known. One particularly useful type of valve for these systems comprises a ball valve. Generally, a ball valve includes a chamber or body with an internal valve chamber with inlet and outlet passages.

[0003] A ball valve member is disposed within the internal valve chamber. The ball valve member comprises a stainless steel ball positioned centrally within the chamber and a cylindrical valve stem which extends from the ball axially through the chamber to a location outside the body. Packing material surrounds the ball and stem and fills the voids between the ball and the chamber, except for passages which extend from the inlet and outlet passages in the body to the ball. A handle attached to the operating stem allows the ball to be rotated, thereby selectively aligning passages in the ball with the inlet and outlet passages in the body. The ball valve can be a two-way valve with a single inlet and single outlet passage, or a three-way valve with a single inlet and a pair of outlet passages, or a pair of inlet passages and one outlet passage, depending on what the particular application requires.

[0004] A needle valve is a type of valve in which a valve member, or a needle, is mounted within a valve body for axial movement along a valve closure axis into, and out of, a valve seat cavity. Flow passages, opening into the valve seat cavity, are formed in the valve body so that the valve can be closed by inserting the needle into the valve seat cavity and opened by withdrawing the needle from the valve seat cavity while providing more accurate control for the passage of the fluid to the outlet.

[0005] As illustrated in Fig. 1, a ball valve 2 and a needle valve 4 can be combined in a parallel manner to control the passage of a fluid within pipeline 6. These two kinds of valves are usually installed parallel to each other in order to exploit the advantages of each one of the valves for various needs. This solution which is illustrated in Fig. 1 suffers from different disadvantages such as: variety of components, many potential leakage points, cost-effectiveness, elevated labor costs, elevated chances for damages, and other disadvantages.

[0006] DE 103 809 C discloses a valve according to the preamble of appended claim 1.

[0007] US 1 921 779 A discloses a gas cock comprising a plug valve and a needle valve connected in a by-pass to it.

[0008] US 2 257 880 A teaches a valve mechanism configured for closing the valve by means of one operation. A rotatable tapered member can be positioned into a closed position by simple rotation thereof. Standard positions corresponding to full flow, shut-off and restricted flow are defined by a control mechanism which is able to discretely fixate the plug in full- flow, shut-off and restricted-flow positions. The control mechanism constitutes an additional arrangement which is appended to a combination of plug and needle valves. The control mechanism comprises a spring-loaded stop washer which is displaced when the valve is switched from one position to another.

[0009] Therefore, there is a long felt need to develop a compact valve which will encapsulate both a ball valve and a needle valve in a single construction. The present invention is intended to comply with this requirement.

[0010] The known in the art valve suffer from the following disadvantages:

1. Ball valves do not have a regulation mode which is between a fully opened mode and a fully closed mode. The known in the art ball valves are designed to operate only for shut-off control.

2. Metering valves are designed to regulate flow in a precise manner, and are not suitable for shut-off control.

SUMMARY OF THE INVENTION

[0011] The present invention is directed to a valve as defined by appended claim 1.

[0012] It is another object of the present invention to provide the valve as defined above, wherein the inlet is fluidly connectable to a fluid source.

[0013] It is another object of the present invention to provide the valve as defined above, wherein at least part of the first passage and at least part of the second passage share a common passage.

[0014] It is another object of the present invention to provide the valve as defined above, wherein the first actuating stem is adapted to control the passage of the fluid between the inlet and the first outlet by reconfiguring the ball member from a SHUT OFF POSITION to an FULL FLOW POSITION, and vice versa, in the SHUT OFF POSITION the passage of the fluid between the inlet and the first outlet through the first passage is prevented, and in the FULL FLOW POSITION

the passage of the fluid between the inlet and the first outlet through the first passage is available; further wherein the second actuating stem is adapted to control the passage of the fluid between the inlet and the second outlet by reconfiguring the controlling end from a CLOSED METERING POSITION to an OPENED METERING POSITION, and vice versa, in the CLOSED METERING POSITION the passage of the fluid between the inlet and the second outlet through the second passage is prevented, and in the OPENED METERING POSITION the passage of the fluid between the inlet and the second outlet through the second passage is available.

[0015] It is another object of the present invention to provide the valve as defined above, wherein in a combination of the CLOSED METERING POSITION of the second actuating stem, and the FULL FLOW POSITION of the first actuating stem, the fluid is able to pass exclusively between the inlet and the first outlet.

[0016] It is another object of the present invention to provide the valve as defined above, wherein in a combination of the OPENED METERING POSITION of the second actuating stem, and the SHUT OFF POSITION of the first actuating stem, the fluid is able to pass exclusively between the inlet and the second outlet.

[0017] It is another object of the present invention to provide the valve as defined above, wherein in a combination of the OPENED METERING POSITION of the second actuating stem, and the OPENED BALL POSITION of the fist actuating stem, the fluid is able to pass between the inlet and the first outlet, and between the inlet and the second outlet in a combined manner.

[0018] It is another object of the present invention to provide the valve as defined above, wherein the second actuating stem is in an intermediate position between said OPENED METERING POSITION and CLOSED METERING POSITION.

[0019] It is another object of the present invention to provide the valve as defined above, further comprising a first packing bolt threadably connectable to the first bonnet, the first packing bolt is adapted to compress a first packing material locatable between the first packing bolt and the first actuating stem.

[0020] It is another object of the present invention to provide the valve as defined above, wherein the first packing bolt is threadably connectable to the first opening of the first bonnet.

[0021] It is another object of the present invention to provide the valve as defined above, further comprising a second packing nut threadably connectable to the second bonnet, the second packing nut is adapted to compress a second packing material locatable between the second packing nut and the second actuating stem.

[0022] It is another object of the present invention to provide the valve as defined above, wherein the second packing nut is threadably connectable to the outer portion of the second bonnet.

[0023] It is another object of the present invention to provide the valve as defined above, wherein the first actuating stem comprises a first handle adapted to rotate the first actuating stem.

[0024] It is another object of the present invention to provide the valve as defined above, wherein the second actuating stem comprises a second handle adapted to rotate the second actuating stem.

[0025] Further, the present invention is directed to a method of manufacturing a valve as defined by appended claim 15.

[0026] It is another object of the present invention to provide a method of manufacturing a valve as defined above, wherein the first actuating stem is adapted to control the passage of the fluid between the inlet and the first outlet by reconfiguring the ball member from a SHUT OFF POSITION to a FULL FLOW POSITION, and vice versa, in the SHUT OFF POSITION the passage of the fluid between the inlet and the first outlet through the first passage is prevented, and in the FULL FLOW POSITION the passage of the fluid between the inlet and the first outlet through the first passage is available; further wherein the second actuating stem is adapted to control the passage of the fluid between the inlet and the second outlet by reconfiguring the controlling end from a CLOSED METERING POSITION to a OPENED METERING POSITION, and vice versa, in the CLOSED METERING POSITION the passage of the fluid between the inlet and the second outlet through the second passage is prevented, and in the OPENED METERING POSITION the passage of the fluid between the inlet and the second outlet through the second passage is available.

[0027] It is another object of the present invention to provide a method of manufacturing a valve as defined above, wherein the second actuating stem is adapted to provide more accurate control than the first actuating stem for the passage of the fluid from the inlet.

[0028] It is another object of the present invention to provide a method of manufacturing a valve as defined above, further comprising steps of: providing a first packing bolt; compressing a first packing material between the first packing bolt and the first actuating stem; and threadably connecting the first packing bolt to the first bonnet.

[0029] It is another object of the present invention to provide a method of manufacturing a valve as defined above, further comprising steps of: providing a second packing nut; compressing a second packing material between the second packing nut and the second actuating stem; and threadably connecting the second packing nut to the second bonnet.

[0030] It is another object of the present invention to provide a method of manufacturing a valve as defined above, further comprising step of connecting a first handle to the first actuating stem, the first handle is adapted to rotate the first actuating stem.

[0031] It is another object of the present invention to provide a method of manufacturing a valve as defined above, further comprising step of connecting a second handle to the second actuating stem, the second handle is adapted to

rotate the second actuating stem.

BRIEF DESCRIPTION OF THE FIGURES

[0032] For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, purely by way of example, to the accompanying drawings in which like numerals designate corresponding elements or sections throughout.

[0033] With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice. In the accompanying drawings:

FIG. 1	is an illustration of the prior art connection of a ball valve with a needle valve connected in a parallel manner;
FIG. 2	is an illustration of a specific embodiment of the present invention;
FIG. 3	is an illustration of a specific embodiment of the present invention;
FIGS 4a and 4b	are illustrations of a prospective views of the specific embodiment of the present invention; and
FIGS 5a, 5b, 6a, 6b and 7a to **7c**	are cross-sectional views of the present invention functioning as a valve in full flow, metering and shut off states, respectively.

[0034] The drawings together with the description make apparent to those skilled in the art how the invention may be embodied in practice.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0035] Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is applicable to other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

[0036] The present invention discloses a valve which is a combination of a needle valve and a ball valve. According to some embodiments, the combination of a needle valve and a ball valve in a single construction may be used for implementing the advantages of each one of the valves. For example, the ball valve may be used for instantly opening a passage to a fluid within a pipe, and for instantly closing said passage. On the other hand, the needle valve may be implemented for providing an accurate control of the amount of fluid which may pass within the pipe.

[0037] According to different aspects of the invention, the elements which are implemented in the present invention may be equivalent to any other elements which may be implemented in ball valves and/or needle valves.

[0038] According to the present invention, the present invention has a ball valve with a ball member. The ball member of the present invention is characterized by at least one additional passage extending within the same. This passage is additional to the known in the art passage which is usually used in a ball member of a ball valve.

[0039] The term **'ball member'** refers hereinafter to a rounded element which is usually used in a ball valve for controlling and providing the passage of a fluid within the valve.

[0040] The term **'needle valve'** refers hereinafter to a valve has a relatively small orifice with a long, tapered seat, and a needle-shaped plunger, on the end of a screw, which exactly fits this seat.

[0041] The term **'metering valve'** refers hereinafter to a particular design of a needle valve, that has a thin and sensitive needle. According to different embodiments of the present invention, the terms 'needle valve' and 'metering valve' may refer to the same type of valve. For example, the term "needle valve" may refer the term 'metering valve', and vice versa.

[0042] The present invention is a design of single valve component, which includes both shut-off and sensitive flow regulation, in a single product. In other words, the present invention is a combination of a ball valve with a needle valve (or a metering valve). This combination is able to exploit the advantages of each one of the valve and thereby provide

a synergetic effect.

[0043] The present invention is able to provide an excessive flow for a metering valve member due to full flow in the ball valve member, which is not possible in known in the art needle valves (or metering valves) due to limited construction of orifices within the same.

[0044] Reference is now made to Figs. 2-3 which schematically illustrate a specific embodiment of valve 100 of the present invention. Valve 100 may be used for controlling a passage of a fluid within a pipe. According to this embodiment, valve 100, comprises the following components:

a. A body 10 which comprises: a first bore 12 and a second bore 14 which extend axially inwardly from the exterior of body 10 and define a valve chamber 20 therebetween; a first outlet 30 fluidly connected to valve chamber 20, and an inlet 32 fluidly connected to valve chamber 20.

b. A first bonnet 40 connected to first bore 12 and having a first opening 42 axially aligned with first bore 12.

c. A second bonnet 50 connected to second bore 14 and having a second opening 52 axially aligned with second bore 14.

d. A ball member 60 disposed within valve chamber 20. Ball member 60 comprises a first passage 62 adapted to allow passage of the fluid between inlet 32 and first outlet 30.

e. A first actuating stem 70 connected to ball member 60 adapted to be located within first opening 42 of first bonnet 40 and to control the passage of the fluid between inlet 32 and first outlet 30.

[0045] According to the present invention, valve 100 further comprises the following components:

f. A second outlet 34 fluidly connectable to valve chamber 20 through second opening 52 of second bonnet 50.
g. A second passage 64 within ball member 60 adapted to provide passage of fluid between inlet 32 and second outlet 34.
h. A second actuating stem 72 located within second opening 52 of second bonnet 50 and having a controlling end 74 fitted to be received within second bore, so as to control the passage of the fluid between inlet 32 and second outlet 34.

[0046] According to the specific embodiment of valve 100 as illustrated in Figs. 2-3, inlet 32 is fluidly connectable to a fluid source (not shown). Furthermore, according to this embodiment, first and second passages 62 and 64 share a common passage 65.

[0047] According to the embodiment of Figs. 2-3, first passage 62 is a horizontal passage which is usually used in known in the art ball valves, and second passage 64 is partially vertical and partially horizontal. The horizontal part of second passage 64 and part of first passage 65 form common passage 65. Common passage 65 is adapted to be fluidly connected to inlet 32 when valve 100 is actuated (i.e., a fluid passes through the valve).

[0048] According to some embodiments, first actuating stem 70 is adapted to control the passage of the fluid between inlet 32 and first outlet 30 by reconfiguring ball member 60 from a SHUT OFF POSITION to a FULL FLOW POSITION, and vice versa. In the SHUT OFF POSITION, the passage of the fluid between inlet 32 and first outlet 30 through first passage 62 is prevented, and in the FULL FLOW POSITION, the passage of the fluid between inlet 32 and first outlet 30 through first passage 62 is available. Second actuating stem 72 is adapted to control the passage of the fluid between inlet 32 and second outlet 34 by reconfiguring controlling end 74 from a CLOSED METERING POSITION to an OPENED METERING POSITION, and vice versa. In the CLOSED METERING POSITION, the passage of the fluid between inlet 32 and second outlet 34 through second passage 64 is prevented, and in the OPENED METERING POSITION, the passage of the fluid between inlet 32 and second outlet 34 through second passage 64 is available.

[0049] According to a preferred embodiment of the present invention, the direction of the passage of the fluid is from inlet 32 to first outlet 30 and/or second outlet 34. According to other embodiments, the direction of the passage of the fluid is from first outlet 30 and/or second outlet 34 to inlet 32.

[0050] According to the embodiments of Figs. 2-3, the first and the second actuating stems 70 and 72 are adapted to reconfigure the valve, so as the provide or prevent passage of the fluid through the valve, by rotational means. According to a specific embodiment, second actuating stem 72 is threadable within second opening 52 of second bonnet 50.

[0051] As illustrated in Fig. 2, second actuating stem 72 is in the OPENED METERING POSITION, and first actuating stem 70 is in the SHUT OFF POSITION, such that the fluid is able to pass through valve 100 between inlet 32 and second outlet 34 through second passage 64. In this figure, valve 100 can be used as a known in the art needle/metering valve.

[0052] As illustrated in Fig. 3, second actuating stem 72 is in the CLOSED METERING POSITION, and first actuating stem 70 is in the FULL FLOW POSITION, such that the fluid is able to pass between inlet 32 and first outlet 30 through first passage 62. In this figure, valve 100 can be used as a known in the art ball valve.

[0053] According to other embodiments, in a combination of a CLOSED METERING POSITION of second actuating stem 70 with a SHUT OFF POSITION of first actuating stem 72, the fluid is unable to pass through valve 100 from inlet 32 to first outlet 30 and to second outlet 34, so the valve 100 is in shut-off position.

[0054] According to other embodiments, in a combination of an OPENED METERING POSITION of second actuating stem 70 with a FULL FLOW POSITION of fist actuating stem 72, the fluid is able to pass between inlet 32 and first outlet 30, and between inlet 32 and second outlet 34 in a combined manner.

[0055] As can be seen in Figs. 2-3, valve 100 further comprises a first packing bolt 80 threadably connectable to the inner side (to opening 42) of first bonnet 40. First packing bolt 80 is adapted to compress a first packing material 85 which is located between first packing bolt 80 and first actuating stem 70. Furthermore, valve 100 comprises a second packing nut 82 threadably connected to the outside portion of second bonnet 50. Second packing nut 82 is adapted to compress a second packing material 87 which is located between second packing nut 82 and second actuating stem 72. According to the embodiment of Figs. 2-3, first actuating stem 70 comprises a first handle 90 adapted to rotate first actuating stem 70, and second actuating stem 72 comprises a second handle 92 adapted to rotate second actuating stem 72.

[0056] Reference is now made to Figs. 4a-b which schematically illustrate perspective view of valve 100 of the present invention. In Fig. 4a, second actuating stem 72 is in the OPENED METERING POSITION, and first actuating stem 70 is in the SHUT OFF POSITION. In Fig. 4b, second actuating stem 72 is in the CLOSED METERING POSITION, and first actuating stem 70 is in the FULL FLOW POSITION.

[0057] Reference is now made to Figs 5a to 5b, presenting one preferred embodiment of the current invention. The valve is switchable between METERING and FULL FLOW configurations. As shown in Fig. 5a, the metering configuration is characterized by a position of the stem 70 providing a fluid communication between the inlet 32 and the outlet 34. A position of the stem 72 controls a rate flow through the valve. Fig. 5b depicts the FULL FLOW configuration, where the stem 70 provides a straight passage from the inlet 32 to the outlet 30.

[0058] Reference is now made to Figs 6a and 6b, presenting another preferred embodiment of the current invention. The valve is switchable between METERING and SHUT OFF configurations. As shown in Fig. 6a, the stems 70 and 72 are in the positions corresponding to METERING configuration. The stem positions are similar to the positions presented in Fig. 5a. Fig. 6b presents SHUT OFF configuration where the stem 70 blocks fluid communication of the inlet 32 with the outlets 30 and 34.

[0059] Reference is now made to Figs 7a to 7c, presenting a further preferred embodiment of the current invention. The valve is switchable between METERING, FULL FLOW and SHUT OFF configurations. As shown in Fig. 7a, the stems 70 and 72 are in the positions corresponding to METERING configuration. The stem positions are similar to the positions presented in Fig. 5a. Fig. 7b depicts the FULL FLOW configuration, where the stem 70 provides a straight passage from the inlet 32 to the outlet 30 similar to configuration presented in Fig. 5b. The SHUT OFF configuration shown in Fig. 7c is characterized by blocking fluid communication of the inlet 32 with the outlets 30 and 34 by the stem 70 similar to the configuration presented in Fig. 6b.

Claims

1. A valve for controlling a passage of a fluid, comprising:

a. a body (10) having: a first bore (12) and a second bore (14) extending inwardly from the exterior of said body (10) and a valve chamber (20) therebetween, a first outlet (30) fluidly connected to said valve chamber (20), and an inlet (32) fluidly connected to said valve chamber (20);

b. a first bonnet (40) connected to said first bore (12) and having a first opening (42) axially aligned with said first bore (12);

c. a second bonnet (50) connected to said second bore (14) and having a second opening (52) axially aligned with said second bore (14);

d. a member (60) disposed within said valve chamber (20), said member (60) comprising a first passage (62) adapted to allow passage of said fluid between said inlet (32) and said first outlet (30); and

e. a first actuating stem (70) connected to said member (60), the first actuating stem (70) being located within said first opening (42) of said first bonnet (40) and adapted to control the passage of said fluid between said inlet (32) and said first outlet (30);

said valve further comprising : a second outlet (34) fluidly connectable to said valve chamber (20) through said second opening (52) of said second bonnet (50); a second passage (64) within said member (60) providing

passage of said fluid between said inlet (32) and said second outlet (34); and a second actuating stem (72) located within said second opening (52) of said second bonnet (50) and having a controlling end (74) fitted to be received within said second bore (14), so as to control the passage of said fluid between said inlet (32) and said second outlet (34); **characterized in that**
said member (60) is a ball member (60), and
said first and second bores (12, 14) are axially aligned, and said first and second actuating stems (70, 72) are positioned oppositely in an in-line manner.

2. The valve according to claim 1, wherein said inlet (32) is fluidly connectable to a fluid source.

3. The valve according to claim 1, wherein at least part of said first passage (62) and at least part of said second passage (64) share a common passage.

4. The valve according to claim 1, wherein said first actuating stem (70) is adapted to control the passage of said fluid between said inlet (32) and said first outlet (30) by reconfiguring said ball member (60) from a SHUT OFF POSITION to an FULL FLOW POSITION, and vice versa, in said SHUT OFF POSITION said passage of said fluid between said inlet (32) and said first outlet (30) through said first passage (62) is prevented, and in said FULL FLOW POSITION said passage of said fluid between said inlet (32) and said first outlet (30) through said first passage (62) is available; further wherein said second actuating stem (72) is adapted to control the passage of said fluid between said inlet (32) and said second outlet (34) by reconfiguring said controlling end (74) from a CLOSED METERING POSITION to a OPENED METERING POSITION, and vice versa, in said CLOSED METERING POSITION said passage of said fluid between said inlet (32) and said second outlet (34) through said second passage (64) is prevented, and in said OPENED METERING POSITION said passage of said fluid between said inlet (32) and said second outlet (34) through said second passage (64) is available.

5. The valve according to claim 4, wherein in a combination of said CLOSED METERING POSITION of said second actuating stem (72), and said FULL FLOW POSITION of said first actuating stem (70), said fluid is able to pass exclusively between said inlet (32) and said first outlet (30).

6. The valve according to claim 4, wherein in a combination of said OPENED METERING POSITION of said second actuating stem (72), and said SHUT OFF POSITION of said first actuating stem (70), said fluid is able to pass exclusively between said inlet (32) and said second outlet (34).

7. The valve according to claim 4, wherein in a combination of said OPENED METERING POSITION of said second actuating stem (72), and said FULL FLOW POSITION of said first actuating stem (70), said fluid is able to pass between said inlet (32) and said first outlet (30), and between said inlet (32) and said second outlet (34) in a combined manner.

8. The valve according to claims 6 or 7, wherein said second actuating stem (72) is in an intermediate position between said OPENED METERING POSITION and CLOSED METERING POSITION.

9. The valve according to claim 1, further comprising a first packing bolt (80) threadably connectable to said first bonnet (40), said first packing bolt (80) is adapted to compress a first packing material (85) locatable between said first packing bolt (80) and said first actuating stem (70).

10. The valve according to claim 10, wherein said first packing bolt (80) is threadably connectable to said first opening (42) of said first bonnet (40).

11. The valve according to claim 1, further comprising a second packing nut (82) threadably connectable to said second bonnet (50), said second packing nut (82) is adapted to compress a second packing material (87) locatable between said second packing nut and said second actuating stem (72).

12. The valve according to claim 12, wherein said second packing nut (82) is threadably connectable to said the outer portion of said second bonnet (50).

13. The valve according to claim 1, wherein said first actuating stem (70) comprises a first handle (90) adapted to rotate said first actuating stem (70).

14. The valve according to claim 1, wherein said second actuating stem (72) comprises a second handle (92) adapted to rotate said second actuating stem (72).

15. A method of manufacturing a valve, comprising steps of:

a. providing a body (10) having: a first bore (12) and a second bore (14) extending inwardly from the exterior of said body (10) and defining a valve chamber (20) therebetween, a first outlet (30) fluidly connected to said valve chamber (20), and an inlet (32) fluidly connected to said valve chamber (20);
b. disposing a member (60) within said valve chamber (20), said member (60) comprising a first passage (62) adapted to allow passage of said fluid between said inlet (32) and said first outlet (30);
c. connecting a first bonnet (40) having a first opening (42) to said first bore (12), such that said first opening (42) being axially aligned with said first bore (12);
d. connecting a second bonnet (50) having a second opening (52) to said second bore (14), such that said second opening (52) being axially aligned with said second bore (14);
e. connecting a first actuating stem (70) to said member (60), said first actuating stem (70) being threaded within said first opening (42) of said first bonnet (40) and controlling the passage of said fluid between said inlet (32) and said first outlet (30);
f. providing a second outlet (34) in said body (10), said second outlet (34) being connectable to said valve chamber (20) through said second opening (52) of said second bonnet (50) ;
g. providing a second passage (64) within said member (60) adapted to provide passage of said fluid between said inlet (32) and said second outlet (34);
h. connecting a second actuating stem (72) to said second bonnet (50) by inserting said second actuating stem (72) into said second opening (52) of said second bonnet (50), said second actuating stem (72) having a controlling end (74) fitted to be received within said second bore (14), so as to control the passage of said fluid between said inlet (32) and said second outlet (34);

characterized in that
said member (60) is a ball member (60), and
said first and second bores (12, 14) are axially aligned, and said first and second actuating stems (72, 74) are positioned oppositely in an in-line manner.

Patentansprüche

1. Ventil zur Regelung des Durchflusses eines Fluids, umfassend:

a. einen Körper (10), der aufweiset: eine erste Bohrung (12) und eine zweite Bohrung (14), die sich von der Außenseite des Körpers (10) einwärts erstrecken, und dazwischen eine Ventilkammer (20), einen ersten Auslass (30), der mit der Ventilkammer (20) fluidverbunden ist, und einen Einlass (32), der mit der Ventilkammer (20) fluidverbunden ist;
b. ein erstes Oberteil (40), das mit der ersten Bohrung (12) verbunden ist und eine axial mit der ersten Bohrung (12) gefluchtete Öffnung (42) aufweiset;
c. ein zweites Oberteil (50), das mit der zweiten Bohrung (14) verbunden ist und eine axial mit der zweiten Bohrung (14) gefluchtete zweite Öffnung (52) aufweiset;
d. ein in der Ventilkammer (20) angeordnetes Element (60), wobei das Element (60) einen ersten Durchgang (62) umfasst, der dazu eingerichtet ist, den Durchfluss des Fluids zwischen dem Einlass (32) und dem ersten Auslass (30) zu gestatten; und
e. eine erste Betätigungsstange (70), die mit dem Element (60) verbunden ist, wobei die erste Betätigungsstange (70) sich in der ersten Öffnung (42) des ersten Oberteils (40) befindet und dazu eingerichtet ist, den Durchfluss des Fluids wischen dem Einlass (32) und dem ersten Auslass (30) zu regeln;

wobei das Ventil weiter umfasst:

einen zweiten Auslass (34), der durch die zweite Öffnung (52) des zweiten Oberteils (50) mit der Ventilkammer (20) fluidverbindbar ist; einen zweiten Durchgang (64) in dem Element (60), der den Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) bereitstellt; und eine zweite Betätigungsstange (72), die sich in der zweiten Öffnung (52) des zweiten Oberteils (50) befindet und ein Regelende (74) aufweiset, das zur Aufnahme in der zweiten Bohrung (14) ausgelegt ist, um den Durchfluss des Fluids zwischen dem Einlass

(32) und dem zweiten Auslass (34) zu regeln;
dadurch gekennzeichnet, dass

das Element (60) ein Kugelelement (60) ist, und
die erste und die zweite Bohrung (12, 14) axial gefluchtet sind und die erste und die zweite Betätigungsstange (70, 72) auf geradlinige Weise entgegengesetzt angeordnet sind.

2. Ventil nach Anspruch 1, wobei der Einlass (32) mit einer Fluidquelle fluidverbindbar ist.

3. Ventil nach Anspruch 1, wobei mindestens ein Teil des ersten Durchgangs (62) und mindestens ein Teil des zweiten Durchgangs (64) einen gemeinsamen Durchgang teilen.

4. Ventil nach Anspruch 1, wobei die erste Betätigungsstange (70) dazu eingerichtet ist, den Durchfluss des Fluids zwischen dem Einlass (32) und dem ersten Auslass (30) zu regeln, indem sie das Kugelelement (60) von einer SPERRSTELLUNG zu einer VOLLSTROM-STELLUNG umkonfiguriert, und umgekehrt, wobei in der SPERRSTELLUNG der Durchfluss von Fluid zwischen dem Einlass (32) und dem ersten Auslass (30) durch den ersten Durchgang (62) verhindert wird, und in der VOLLSTROM-STELLUNG der Durchfluss des Fluids zwischen dem Einlass (32) und dem ersten Auslass (30) durch den ersten Durchgang (62) möglich ist; wobei weiterhin die zweite Betätigungsstange (72) dazu eingerichtet ist, den Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) zu regeln, indem sie das Regelende (74) von einer GESCHLOSSENEN DOSIERSTELLUNG zu einer OFFENEN DOSIERSTELLUNG umkonfiguriert, und umgekehrt, wobei in der GESCHLOSSENEN DOSIERSTELLUNG der Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) durch den zweiten Durchgang (64) verhindert wird und in der OFFENEN DOSIERSTELLUNG der Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) durch den zweiten Durchgang (64) möglich ist.

5. Ventil nach Anspruch 4, wobei in einer Kombination der GESCHLOSSENEN DOSIERSTELLUNG der zweiten Betätigungsstange (72) und der VOLLSTROM-STELLUNG der ersten Betätigungsstange (70) das Fluid ausschließlich zwischen dem ersten Einlass (32) und dem ersten Auslass (30) passieren kann.

6. Ventil nach Anspruch 4, wobei in einer Kombination der OFFENEN DOSIERSTELLUNG der zweiten Betätigungsstange (72) und der SPERRSTELLUNG der ersten Betätigungsstange (70) das Fluid ausschließlich zwischen dem Einlass (32) und dem zweiten Auslass (34) passieren kann.

7. Ventil nach Anspruch 4, wobei in einer Kombination der OFFENEN DOSIERSTELLUNG der zweiten Betätigungsstange (72) und der VOLLSTROM-STELLUNG der ersten Betätigungsstange (70) das Fluid auf kombinierte Weise zwischen dem Einlass (32) und dem ersten Auslass (30), und zwischen dem Einlass (32) und dem zweiten Auslass (34), passieren kann.

8. Ventil nach Ansprüchen 6 oder 7, wobei die zweite Betätigungsstange (72) sich in einer Zwischenstellung wischen der OFFENEN DOSIERSTELLUNG und der GESCHLOSSENEN DOSIERSTELLUNG befindet.

9. Ventil nach Anspruch 1, weiter eine erste Dichtungsmutter (80) umfassend, die schraubbar mit dem ersten Oberteil (40) verbindbar ist, wobei die erste Dichtungsmutter (80) zum Komprimieren eines ersten Dichtungsmaterials (85), das wischen der ersten Dichtungsmutter (80) und der ersten Betätigungsstange (70) angeordnet werden kann, eingerichtet ist.

10. Ventil nach Anspruch 10, wobei die erste Dichtungsmutter (80) schraubbar mit der ersten Öffnung (42) des ersten Oberteils (40) verbindbar ist.

11. Ventil nach Anspruch 1, weiter eine zweite Dichtungsmutter (82) umfassend, die schraubbar mit dem zweiten Oberteil (50) verbindbar ist, wobei die zweite Dichtungsmutter (82) zum Komprimieren eines zweiten Dichtungsmaterials (87), das zwischen der zweiten Dichtungsmutter und der zweiten Betätigungsstange (72) angeordnet werden kann, eingerichtet ist.

12. Ventil nach Anspruch 12, wobei die zweite Dichtungsmutter (82) schraubbar mit dem äußeren Teil des zweiten Oberteils (50) verbindbar ist.

13. Ventil nach Anspruch 1, wobei die erste Betätigungsstange (70) einen ersten Handgriff (90) umfasst, der zum

Rotieren der ersten Betätigungsstange (70) eingerichtet ist.

14. Ventil nach Anspruch 1, wobei die zweite Betätigungsstange (72) einen zweiten Handgriff (92) umfasst, der zum Rotieren der zweiten Betätigungsstange (72) eingerichtet ist.

15. Verfahren zur Herstellung eines Ventils, umfassend folgende Schritte:

a. Bereitstellen eines Körpers (10), der aufweist: eine erste Bohrung (12) und eine zweite Bohrung (14), die sich von der Außenseite des Körpers (10) einwärts erstrecken und dazwischen eine Ventilkammer (20) definieren, einen ersten Auslass (30), der mit der Ventilkammer (20) fluidverbunden ist, und einen Einlass (32), der mit der Ventilkammer (20) fluidverbunden ist;
b. Anordnen eines Elements (60) innerhalb der Ventilkammer (20), wobei das Element (60) einen ersten Durchgang (62) umfasst, der dazu eingerichtet ist, den Durchfluss des Fluids zwischen dem Einlass (32) und dem ersten Auslass (30) zu gestatten;
c. Verbinden eines ersten Oberteils (40), das eine erste Öffnung (42) aufweiset, mit der ersten Bohrung (12), sodass diese erste Öffnung (42) axial mit der ersten Bohrung (12) gefluchtet ist;
d. Verbinden eines zweiten Oberteils (50), das eine zweite Öffnung (52) aufweist, mit der zweiten Bohrung (14), sodass diese zweite Öffnung (52) axial mit der zweiten Bohrung (14) gefluchtet ist;
e. Verbinden einer ersten Betätigungsstange (70) mit dem Element (60), wobei die erste Betätigungsstange (70) in der ersten Öffnung (42) des ersten Oberteils (40) eingeschraubt ist und den Durchfluss des Fluids zwischen dem Einlass (32) und dem ersten Auslass (30) regelt;
f. Bereitstellen eines zweiten Auslasses (34) in dem Körper (10), wobei der zweite Auslass (34) durch die zweite Öffnung (52) des zweiten Oberteils (50) mit der Ventilkammer (20) verbindbar ist;
g. Bereitstellen eines zweiten Durchgangs (64) in dem Element (60), der dazu eingerichtet ist, den Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) bereitzustellen;
h. Verbinden einer zweiten Betätigungsstange (72) mit dem zweiten Oberteil (50) durch Einbringen der zweiten Betätigungsstange (72) in die zweite Öffnung (52) des zweiten Oberteils (50), wobei die zweite Betätigungsstange (72) ein Regelende (74) aufweist, das zur Aufnahme in der zweiten Bohrung (14) ausgelegt ist, um den Durchfluss des Fluids zwischen dem Einlass (32) und dem zweiten Auslass (34) zu regeln;

dadurch gekennzeichnet, dass

das Element (60) ein Kugelelement (60) ist, und
die erste und die zweite Bohrung (12, 14) axial gefluchtet sind und die erste und die zweite Betätigungsstange (70, 72) auf geradlinige Weise entgegengesetzt angeordnet sind.

Revendications

1. Vanne pour régler un passage d'un fluide, comprenant :

a. un corps (10) possédant : un premier alésage (12) et un second alésage (14) s'étendant vers l'intérieur à partir de l'extérieur dudit corps (10) et une chambre de vanne (20) entre les deux, une première sortie (30) reliée fluidiquement à ladite chambre de vanne (20) et une entrée (32) reliée fluidiquement à ladite chambre de vanne (20) ;
b. un premier chapeau (40) relié audit premier alésage (12) et possédant une première ouverture (42) disposée en alignement axial avec ledit premier alésage (12) ;
c. un second chapeau (50) relié audit second alésage (14) et possédant une seconde ouverture (52) disposée en alignement axial avec ledit second alésage (14) ;
d. un élément (60) disposé au sein de ladite chambre de vanne (20), ledit élément (60) comprenant un premier passage (62) conçu pour permettre le passage dudit fluide entre ladite entrée (32) et ladite sortie (30) ; et
e. une première tige d'activation (70) reliée audit élément (60), la première tige d'activation (70) étant disposée au sein de ladite première ouverture (42) dudit premier chapeau (40) et étant conçue pour régler le passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) ;

ladite vanne comprenant en outre :

une seconde sortie (34) qui peut venir se relier fluidiquement à ladite chambre de vanne (20) à travers ladite

seconde ouverture (52) dudit second chapeau (50) ;
un second passage (64) au sein dudit élément (60), procurant un passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) ; et
une seconde tige d'activation (72) disposée au sein de ladite seconde ouverture (52) dudit second chapeau (50) et possédant une extrémité de réglage (74) conçue pour venir se loger au sein dudit second alésage (14) de façon à régler le passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) ;
caractérisée en ce que
ledit élément (60) est un élément en forme de bille (60) ; et
ledit premier et ledit second alésage (12, 14) sont disposés en alignement axial, et ladite première et ladite seconde tige d'activation (70, 72) sont disposées à l'opposé l'une de l'autre dans une configuration en ligne.

2. Vanne selon la revendication 1, dans laquelle ladite entrée (32) peut venir se relier fluidiquement à une source de fluide.

3. Vanne selon la revendication 1, dans laquelle au moins une partie dudit premier passage (62) et au moins une partie dudit second passage (64) partagent un passage commun.

4. Vanne selon la revendication 1, dans laquelle ladite première tige d'activation (70) est conçue pour régler le passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) via une reconfiguration dudit élément (60) en forme de bille qui passe d'une POSITION DE FERMETURE à une POSITION DE PLEIN DEBIT, et vice versa, dans ladite POSITION DE FERMETURE, ledit passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) à travers ledit premier passage (62) étant empêché, et dans ladite POSITION DE PLEIN DEBIT, ledit passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) à travers ledit premier passage (62) étant possible ; en outre, dans laquelle ladite seconde tige d'activation (72) est conçue pour régler le passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) par reconfiguration de ladite extrémité de réglage (74) qui passe d'une POSITION DE DOSAGE FERMEE à une POSITION DE DOSAGE OUVERTE et vice versa, dans ladite POSITION DE DOSAGE FERMEE, ledit passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) à travers ledit second passage (64) étant empêché, et dans ladite POSITION DE DOSAGE OUVERTE, ledit passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) à travers ledit second passage (64) étant possible.

5. Vanne selon la revendication 4, dans laquelle, dans une combinaison de ladite POSITION DE DOSAGE FERMEE de ladite seconde tige d'activation (72) et de ladite POSITION DE PLEIN DEBIT de ladite première tige d'activation (70), ledit fluide a la possibilité de passer exclusivement entre ladite entrée (32) et ladite première sortie (30).

6. Vanne selon la revendication 4, dans laquelle, dans une combinaison de ladite POSITION DE DOSAGE OUVERTE de ladite seconde tige d'activation (72) et de ladite POSITION DE FERMETURE de ladite première tige d'activation (70), ledit fluide a la possibilité de passer exclusivement entre ladite entrée (32) et ladite seconde sortie (34).

7. Vanne selon la revendication 4, dans laquelle, dans une combinaison de ladite POSITION DE DOSAGE OUVERTE de ladite seconde tige d'activation (72) et de ladite POSITION DE PLEIN DEBIT de ladite première tige d'activation (70), ledit fluide a la possibilité de passer entre ladite entrée (32) et ladite première sortie (30), et entre ladite entrée (32) et ladite seconde sortie (34), d'une manière combinée.

8. Vanne selon la revendication 6 ou 7, dans laquelle ladite seconde tige d'activation (72) se trouve dans une position intermédiaire entre ladite POSITION DE DOSAGE OUVERTE et ladite POSITION DE DOSAGE FERMEE.

9. Vanne selon la revendication 1, comprenant en outre un premier écrou de presse-garniture (80) qui peut venir se relier par filet de vis audit premier chapeau (40), ledit premier écrou de presse-garniture (80) étant conçu pour comprimer une première matière faisant office de garniture (85) qui peut venir se disposer entre ledit premier écrou de presse-garniture (80) et ladite première tige d'activation (70).

10. Vanne selon la revendication 10, dans laquelle ledit premier écrou de presse-garniture (80) peut venir se relier par filet de vis à ladite première ouverture (42) dudit premier chapeau (40).

11. Vanne selon la revendication 1, comprenant en outre un second écrou de presse-garniture (82) qui peut venir se relier par filet de vis audit second chapeau (50), ledit second écrou de presse-garniture (82) étant conçu pour comprimer une seconde matière faisant office de garniture (87) qui peut venir se disposer entre ledit second écrou de presse-garniture et ladite seconde tige d'activation (72).

12. Vanne selon la revendication 12, dans laquelle ledit second écrou de presse-garniture (82) peut venir se relier par filet de vis à ladite portion externe dudit second chapeau (50).

13. Vanne selon la revendication 1, dans laquelle ladite première tige d'activation (70) comprend une première poignée (90) conçue pour la mise en rotation de ladite première tige d'activation (70).

14. Vanne selon la revendication 1, dans laquelle ladite seconde tige d'activation (72) comprend une seconde poignée (92) conçue pour la mise en rotation de ladite seconde tige d'activation (72).

15. Procédé de fabrication d'une vanne, comprenant les étapes consistant à :

a. procurer un corps (10) possédant: un premier alésage (12) et un second alésage (14) s'étendant vers l'intérieur à partir de l'extérieur dudit corps (10) et définissant une chambre de vanne (20) entre les deux, une première sortie (30) reliée fluidiquement à ladite chambre de vanne (20) et une entrée (32) reliée fluidiquement à ladite chambre de vanne (20) ;
b. disposer un élément (60) au sein de ladite chambre de vanne (20), ledit élément (60) comprenant un premier passage (62) conçu pour permettre le passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) ;
c. relier un premier chapeau (40) possédant une première ouverture (42) audit première alésage (12) d'une manière telle que ladite première ouverture (42) est disposée en alignement axial avec ledit premier alésage (12) ;
d. relier un second chapeau (50) possédant une seconde ouverture (52) audit second alésage (14) d'une manière telle que ladite seconde ouverture (52) est disposée en alignement axial avec ledit second alésage (14) ;
e. relier une première tige d'activation (70) audit élément (60), ladite première tige d'activation (70) étant vissée au sein de ladite première ouverture (42) dudit premier chapeau (40) et réglant le passage dudit fluide entre ladite entrée (32) et ladite première sortie (30) ;
f. procurer une seconde sortie (34) dans ledit corps (10), ladite seconde sortie (34) pouvant venir se relier à ladite chambre de vanne (20) à travers ladite seconde ouverture (52) dudit second chapeau (50) ;
g. procurer un second passage (64) au sein dudit élément (60) conçu pour procurer un passage dudit fluide entre ladite entrée (32) et ladite second sortie (34) ;
h. relier une seconde tige d'activation (72) audit second chapeau (50) en insérant ladite seconde tige d'activation (72) dans ladite seconde ouverture (52) dudit second chapeau (50), ladite seconde tige d'activation (72) possédant une extrémité de réglage (74) conçue pour venir se loger au sein dudit second alésage (14) de façon à régler le passage dudit fluide entre ladite entrée (32) et ladite seconde sortie (34) ;

caractérisé en ce que
ledit élément (60) est un élément en forme de bille (60) ; et
ledit premier et ledit second alésage (12, 14) sont disposés en alignement axial, et ladite première et ladite seconde tiges d'activation (70, 72) sont disposées à l'opposé l'une de l'autre dans une configuration en ligne.

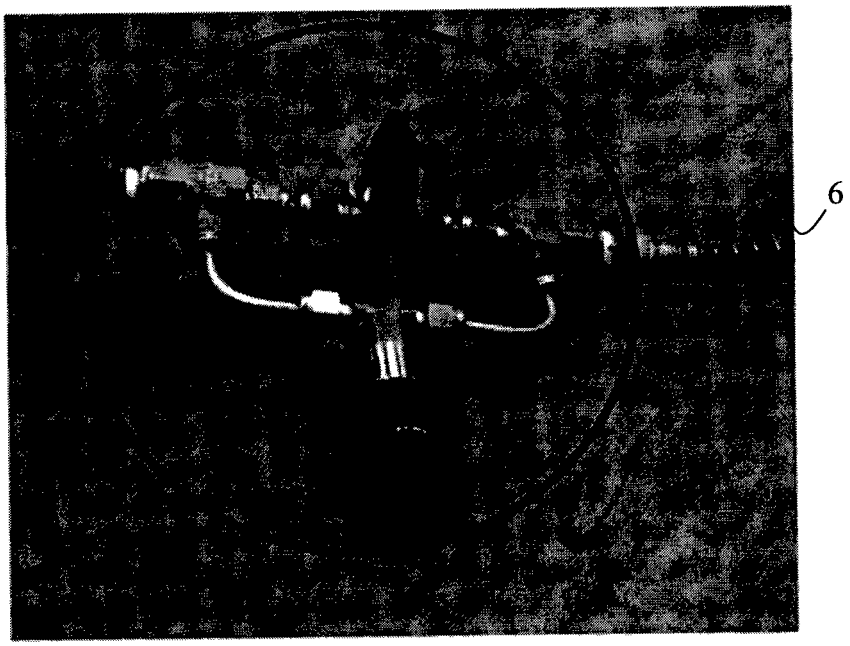

Fig. 1

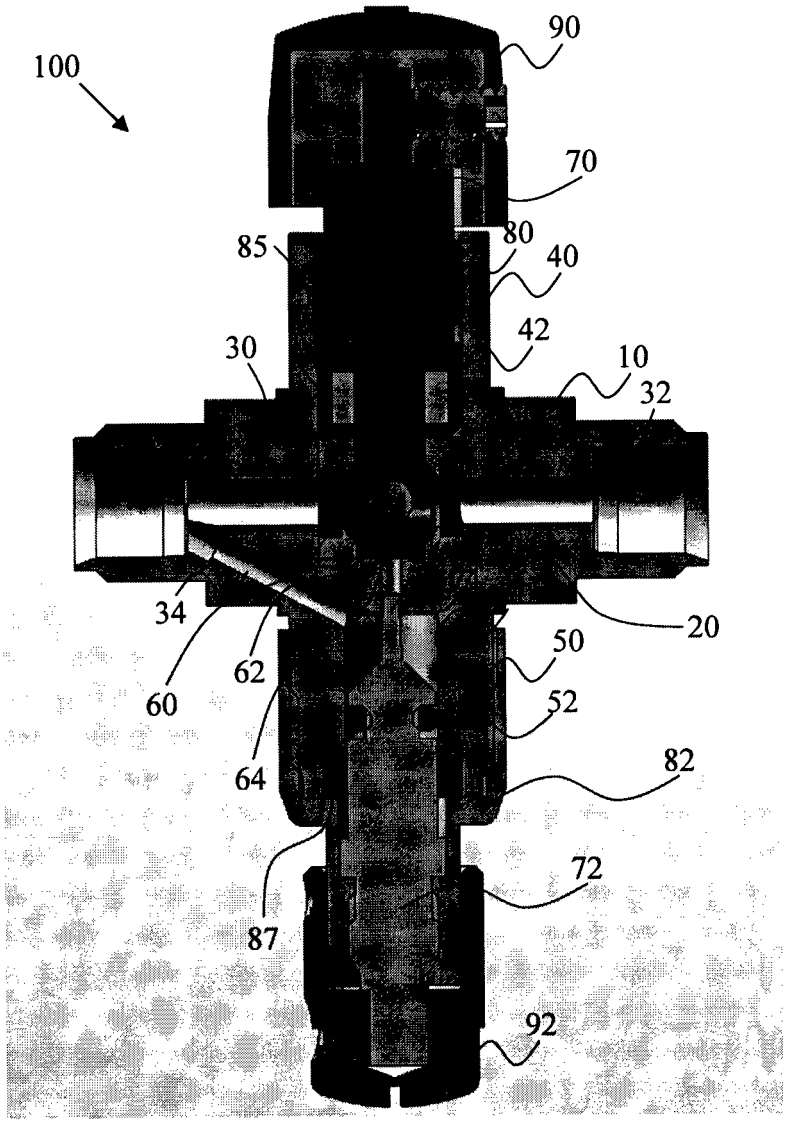

Fig. 2

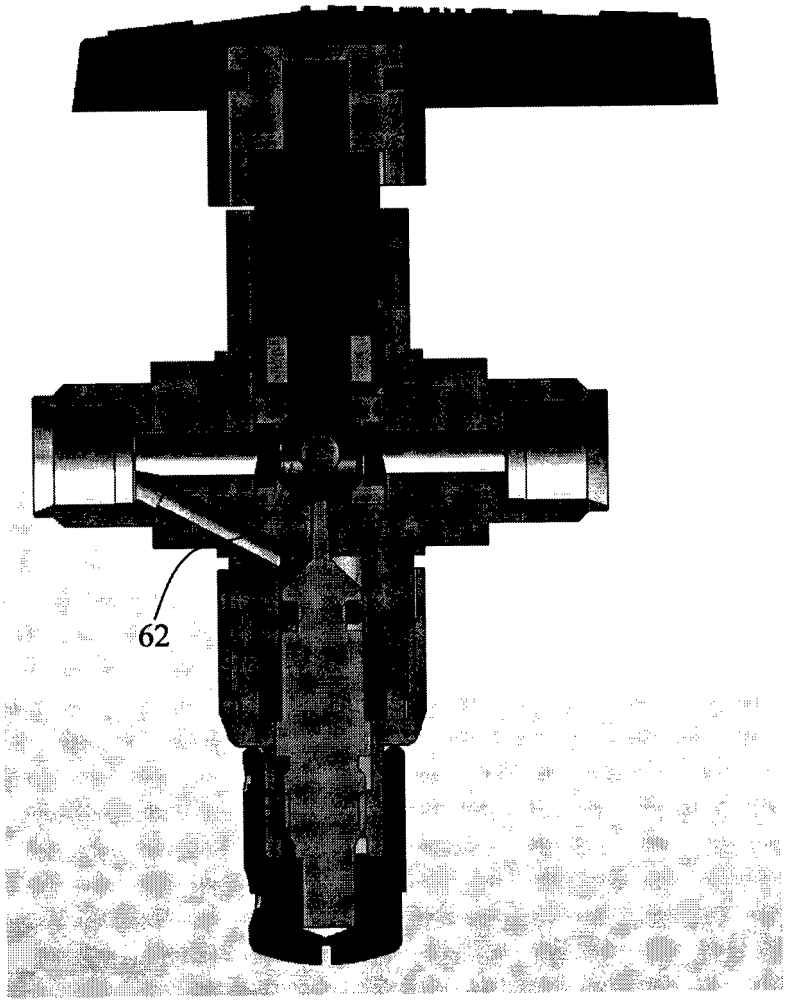

Fig. 3

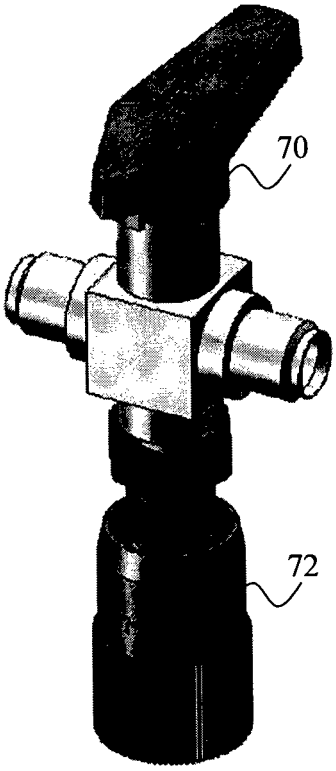

Fig. 4a

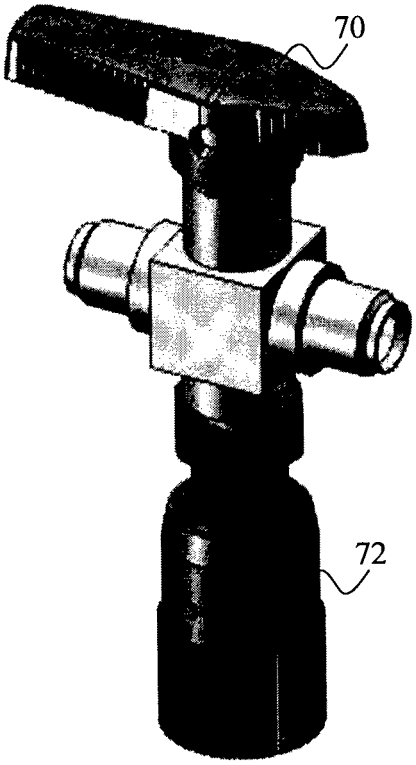

Fig. 4b

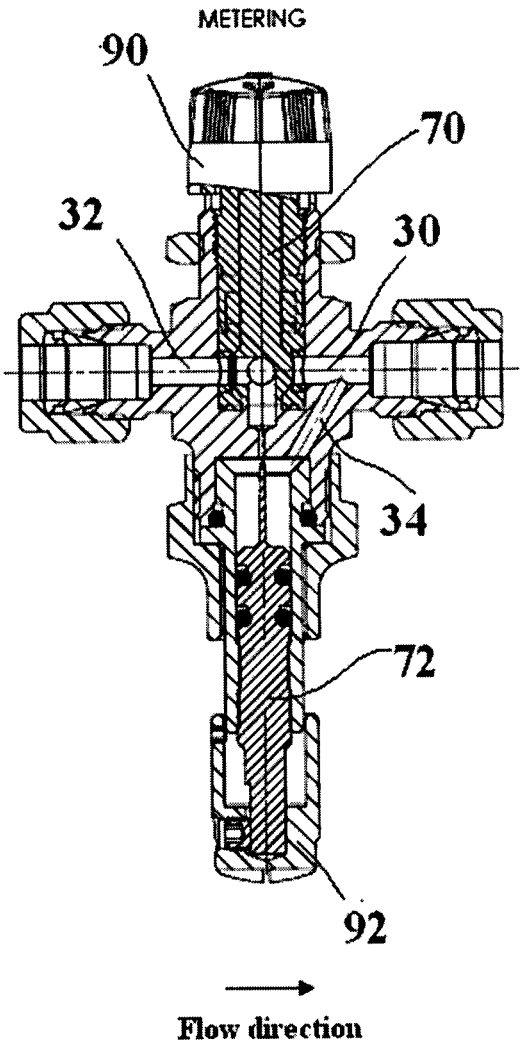
METERING
90
70
32
30
34
72
92
Flow direction

Fig. 5a

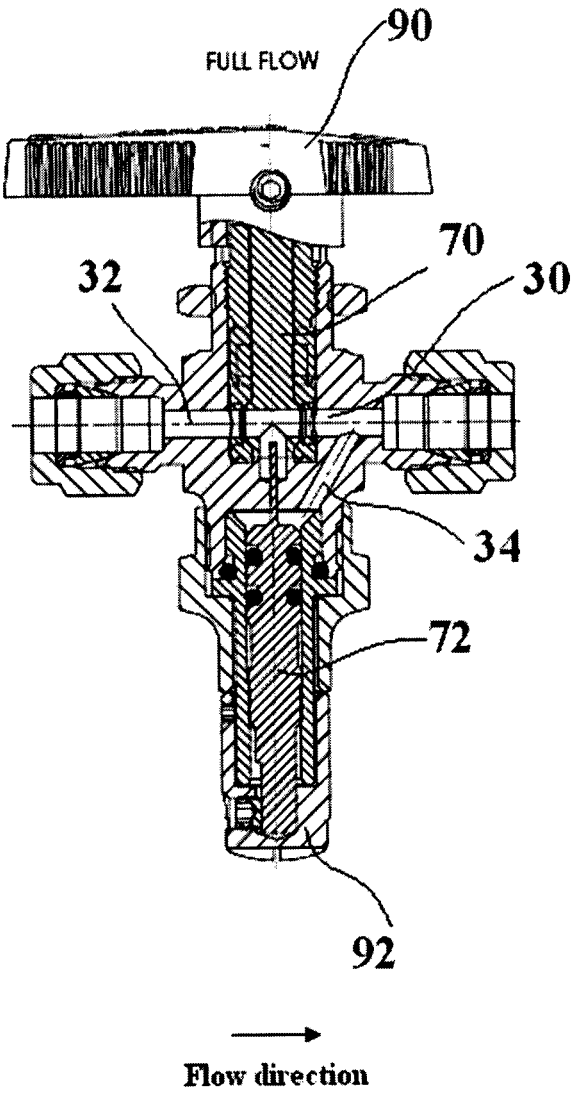
FULL FLOW
90
70
32
30
34
72
92
Flow direction

Fig. 5b

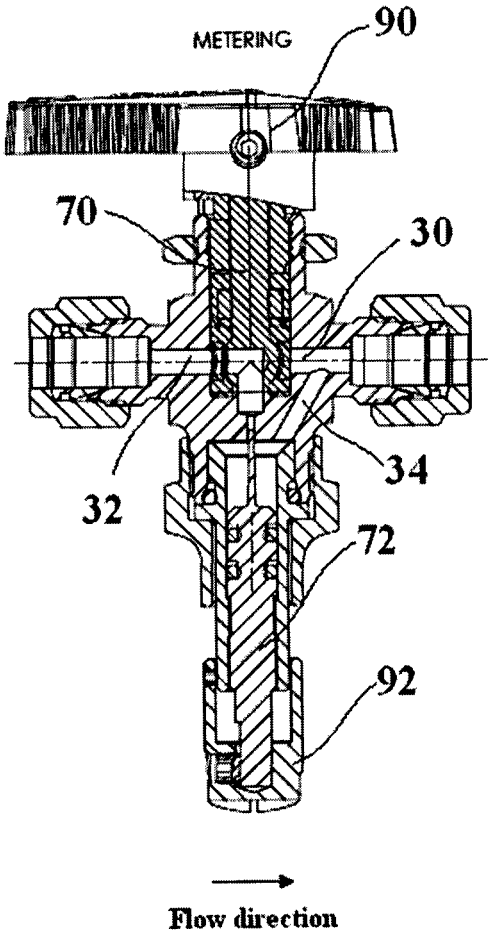
METERING
90
70
30
32
34
72
92
Flow direction

Fig. 6a

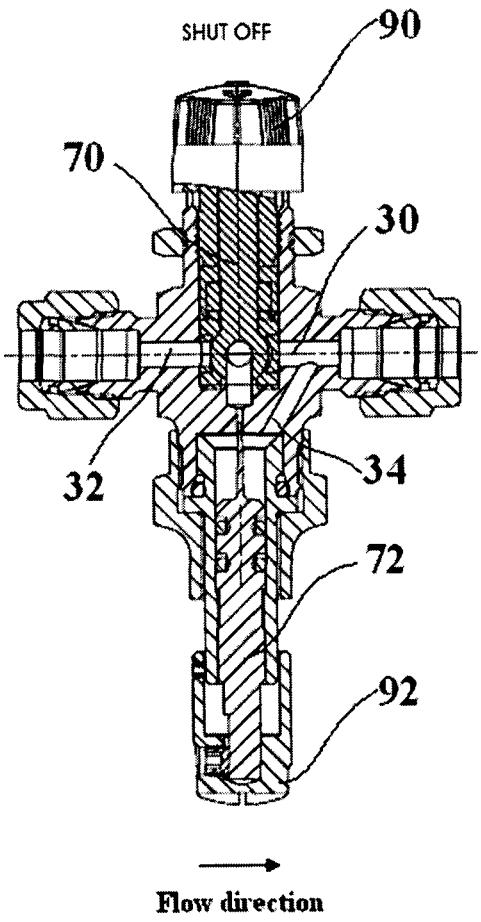
SHUT OFF
90
70
30
32
34
72
92
Flow direction

Fig. 6b

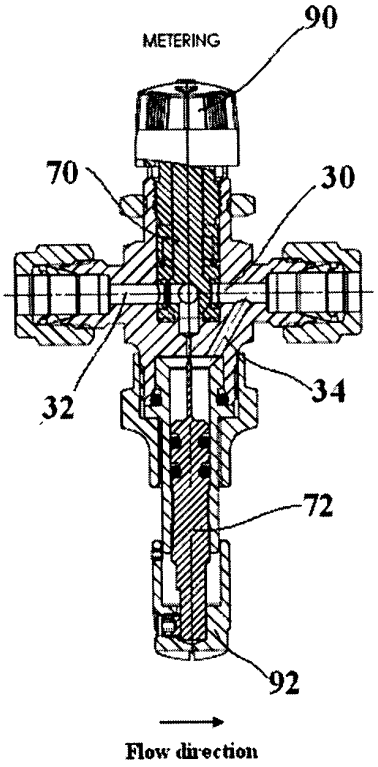

Fig. 7a

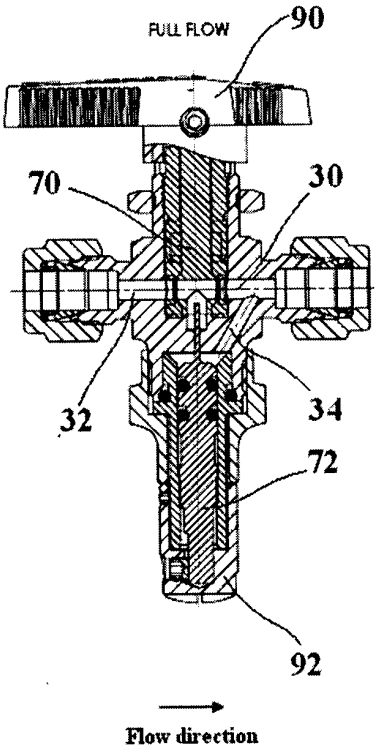

Fig.7b

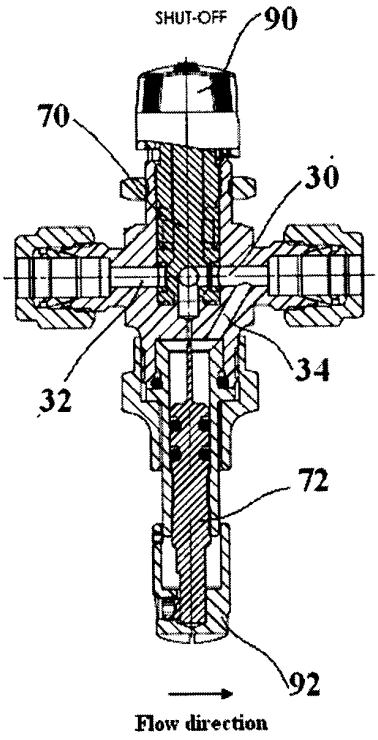

Fig. 7c

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 103809 C **[0006]**
- US 1921779 A **[0007]**
- US 2257880 A **[0008]**